

REMARKS

This Amendment responds to the Office Action dated July 20, 2007 in which the Examiner objected to the previously filed Amendment, objected to the disclosure, rejected claims 1, 4 and 7 under 35 U.S.C. § 112 first and second paragraphs, and rejected claims 1-2, 4-5, 7-8, 10-11, 13-14 and 16-17 under 35 U.S.C. § 103.

Applicants respectfully note that although the Examiner acknowledged priority in the Office Action dated December 2, 2005 (Paper No. 101), the Examiner did not acknowledge priority on PTOL-326. Applicants respectfully request the Examiner check box 12(a)(3).

As indicated above, equation 4 on page 12 has been amended to correct a typographical error. In particular, when the application was filed, the Hamming window equation contained two typographical errors. The first error inadvertently changed the minus sign in the equation to a plus sign. The second typographical error omitted 2 before pi. This equation is well known in the art as evidenced by the attached article entitled "Windowing Functions Improving FFT Results, Part I" dated June 1, 1998. Page 6 of this article shows the Hamming window equation 4. Applicants respectfully submit that the typographical errors in equation 4 have been corrected. Furthermore, Applicants respectfully submit that no new matter has been added. Therefore, Applicants respectfully request that the Examiner withdraws the objection under 35 U.S.C. § 132(a).

As indicated above, page 6 of the application has been amended for clearer meaning. Applicants respectfully request the Examiner approves the correction and withdraws the objection to the disclosure.

As indicated above, claims 1, 4 and 7 have been amended to contain subject matter described in the Specification and to more particularly point out and distinctly claim the subject

matter which the Applicants regard as the invention. Therefore, Applicants respectfully request the Examiner withdraws the rejection to claims 1, 4 and 7 under 35 U.S.C. § 112 first and second paragraphs.

As indicated above, claims 1, 4, 7, 10, 13 and 16 have been amended in order to make explicit what is implicit in the claims. The amendment is unrelated to a statutory requirement for patentability.

Claim 1 claims a digital audio signal processing method, claim 4 claims a digital audio signal processing device, and claim 7 claims a computer-readable medium storing program code executed by a digital audio signal processing device. Claim 10 claims a learning method, claim 13 claims a learning device, and claim 16 claims a computer-readable medium storing program code. The methods, devices and program code include cutting parts out of a digital audio signal by plural windows having different sizes. A self correlation coefficient is calculated based on each cut-out part of the digital audio signal. Cut-out ranges of time and phase changes are determined based on the self correlation coefficients. The cut-out ranges are compressed to form compressed data patterns. The compressed data patterns are classified into classes based upon the phase changes. A set of prediction coefficients are selected based upon the classified compressed data patterns. Finally, a new digital audio signal is generated as claimed in claims 1, 4 and 7 or prediction coefficients are calculated and stored as claimed in claims 10, 13 and 16.

By (a) determining cut-out ranges of time and phase changes based upon self-correlation coefficients, (b) compressing the cut-out ranges and (c) classifying the compressed data patterns into classes based upon the phase changes as claimed in claims 1, 4, 7, 10, 13 and 16, the claimed invention provides a method, device and program code which improves waveform

reproducibility based upon a waveform of a signal. The prior art does not show, teach or suggest the invention as claimed in claims 1, 4, 7, 10, 13 and 16.

Claims 1-2, 4-5, 7-8, 10-11, 13-14 and 16-17 were rejected under 35 U.S.C. § 103 as being unpatentable over *Imai et al.* (U.S. Patent No. 6,360,198) in view of *Thyssen* (U.S. Publication No. 2002/0138256).

Imai et al. appears to disclose auto-correlation analysis is performed using a plurality of window widths having different values. (Col. 7 line 62 - Col. 8 lines 1-2). Nothing in *Imai et al.* shows, teaches or suggests (a) determining cut-out ranges of time and phase changes based on self-correlation coefficients, (b) compressing the cut-out ranges to form compressed data patterns and (c) classifying the compressed data patterns into classes based upon the phase changes as claimed in claims 1, 4, 7, 10, 13 and 16. Rather, *Imai et al.* only discloses performing auto-correlation analysis using a plurality of window widths having different values.

Additionally, *Imai et al.* only discloses adjusting pitch of the reproduced audio signal based upon reproduction speed (Col. 2 lines 18-28). Nothing in *Imai et al.* shows, teaches or suggests (a) selecting a set of prediction coefficients based upon classification of compressed data patterns and generating a new digital audio signal based upon the prediction coefficients and cut-out ranges as claimed in claims 1, 4 and 7 or (b) calculating prediction coefficients based upon a digital audio signal and a student digital audio signal as claimed in claims 10, 13 and 16. Rather, *Imai et al.* only discloses adjusting the pitch based upon reproduction speed.

Thyssen appears to disclose classifying noise, unvoiced speech and voiced speech and adaptively selecting a plurality of modeling schemes most suited for the current speech [0032].

Thus, *Thyssen* only discloses a speech encoder which classifies noise, unvoiced speech and voiced speech and selects a modeling scheme most suited for the current speech. Nothing in

Thyssen shows, teaches or suggests (a) determining cut-out ranges of time and phase changes based upon self correlation coefficients, (b) compressing the cut-out ranges to form compressed data patterns and (c) classifying the compressed data patterns into classes based upon phase changes as claimed in claims 1, 4, 7, 10, 13 and 16. Rather *Thyssen* only discloses selecting a modeling scheme based upon noise, unvoiced speech and voiced speech.

The combination of *Imai et al.* and *Thyssen* would merely suggest to adjust the pitch based upon reproduction speed as taught by *Imai et al.* and to select a modeling scheme based upon the current speech as taught by *Thyssen*. Thus nothing in the combination of *Imai et al.* and *Thyssen* show, teach or suggest (a) determining cut-out ranges of time and phase changes based upon self correlation coefficients, (b) compressing the cut-out ranges to form compressed data patterns and (c) classifying the compressed data patterns into classes based upon phase changes as claimed in claims 1, 4, 7, 10, 13 and 16. Therefore, Applicants respectfully request the Examiner withdraws the rejection to claims 1, 4, 7, 10, 13 and 16 under 35 U.S.C. § 103.

Claims 2, 5, 8, 11, 14 and 17 recite additional features. Applicants respectfully submit that claims 2, 5, 8, 11, 14 and 17 would not have been obvious within the meaning of 35 U.S.C. § 103 over *Imai et al.* and *Thyssen* at least for the reasons as set forth above. Therefore, Applicants respectfully request the Examiner withdraws the rejection to claims 2, 5, 8, 11, 14 and 17 under 35 U.S.C. § 103.

CONCLUSION

Thus it now appears that the application is in condition for reconsideration and allowance. Reconsideration and allowance at an early date are respectfully requested. Should the Examiner find that the application is not now in condition for allowance, Applicants respectfully request the Examiner enters this amendment for purposes of appeal.

If for any reason the Examiner feels that the application is not now in condition for allowance, the Examiner is requested to contact, by telephone, the Applicants' undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed within the currently set shortened statutory period, Applicants respectfully petition for an appropriate extension of time. The fees for such extension of time may be charged to Deposit Account No. 50-0320.

In the event that any additional fees are due with this paper, please charge our Deposit Account No. 50-0320.

Respectfully submitted,

FROMMER LAWRENCE & HAUG LLP
Attorneys for Applicants

Date: September 19, 2007

By: 

Ellen Marie Erbas
Registration No. 32,131
(202) 292-1530